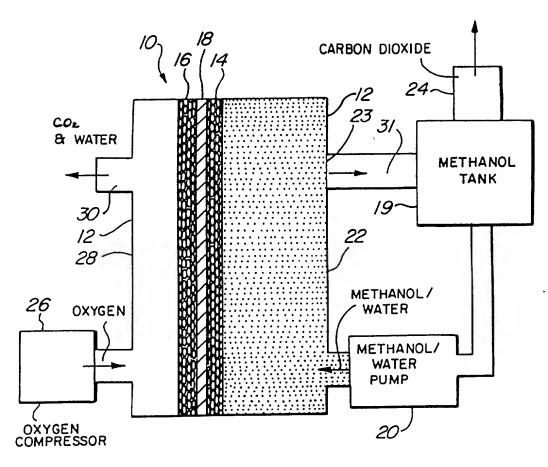
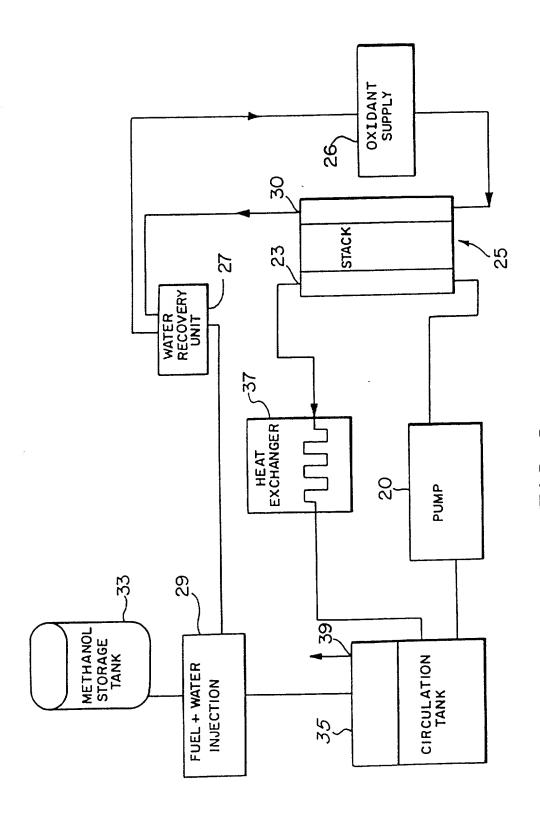
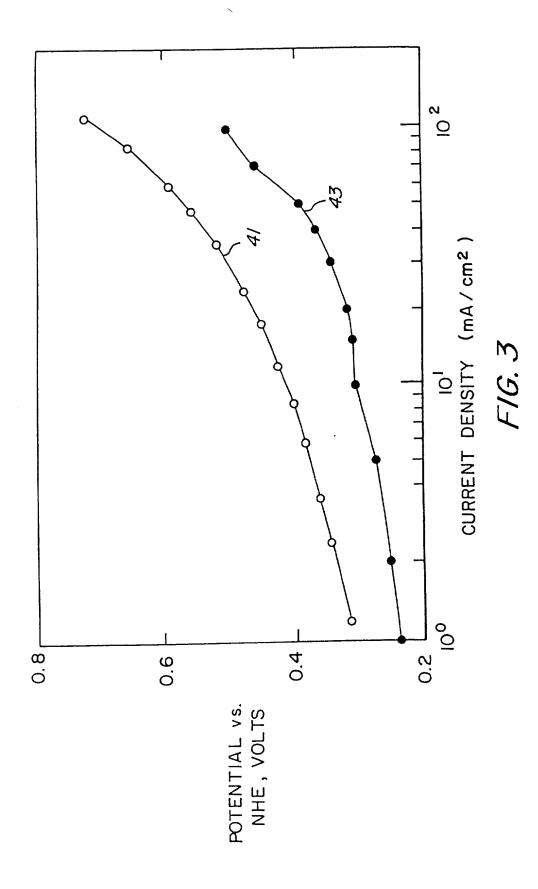
FIG. 1



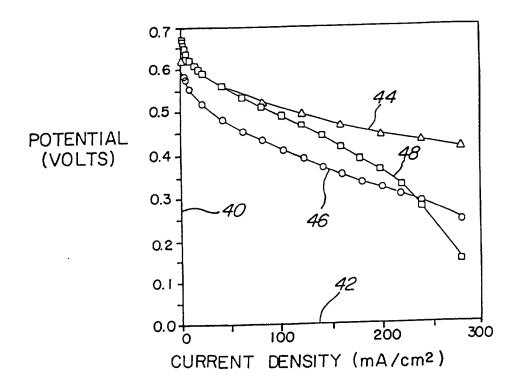
F/G. 4 1.0 0.9 0.8 0.7 36 VOLTAGE METH / OXYGEN (VOLTS) 0.6 0.5 38 METH / AIR 0.4 0.3 0.2 34 0.1 0.0 100 80 60 40 20 0 (mA/cm^2) CURRENT DENSITY

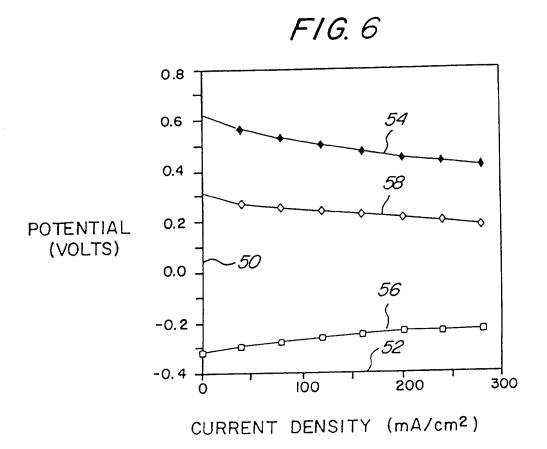


F16.2



F1G. 5





IMMERSE THE CARBON ELECTRODE STRUCTURE IN 1% SOLUTION OF NAFION IN METHANOL FOR ABOUT 5 MINUTES TO ACHIEVE IMPREGNATION OF THE NAFION INTO THE ELECTRODE TO A LOADING

OF $0.1 - 0.5 \,\mathrm{mg}\,/\,\mathrm{cm}^2$.

304

1302

REMOVE ELECTRODE FROM SOLUTION AND DRY IN VACUUM.

F1G. 7

F/G. //

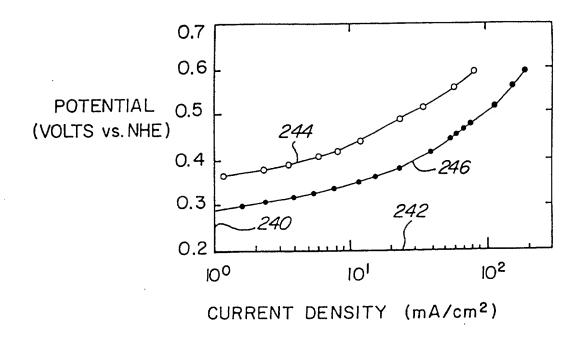
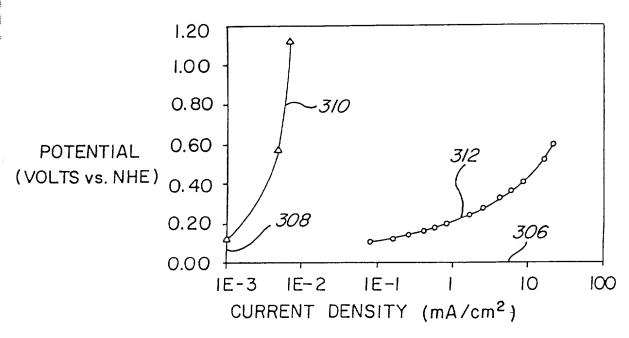


FIG. 8



PREPARE CARBON ELECTRODE STRUCTURES FROM A MIXTURE OF 200m2/g HIGH SURFACE AREA CARBON PARTICLES AND TEFLON BINDER (15%) APPLIED TO A FIBER-BASE CARBON PAPER.

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PREPARE A BATH OF HYDROGEN

PREPARE A BATH OF HYDROGEN
HEXACHLOROPALTINATE AND POTASSIUM
PENTACHLOROAQUORUTHENIUM WITH A METAL
ION CONCENTRATION IN THE RANGE OF 0.01-0.05M
DISSOLVED IN 1M SULFURIC ACID.

ADD PERFLUOROOCTANESULFONIC ACID TO BATH WITH A CONCENTRATION IN THE RANGE OF 0.1-1.0g1-1

POSITION THE CARBON ELECTRODE IN THE BATH ALONG WITH A PLATINUM ANODE.

APPLY A VOLTAGE BETWEEN THE CARBON ELECTRODE AND THE ANODE FOR ABOUT 5-10 MINUTES TO ACHIEVE ELECTRODEPOSITION OF PLATINUM-RUTHENIUM TO A LOADING OF ABOUT 5 mg/cm².

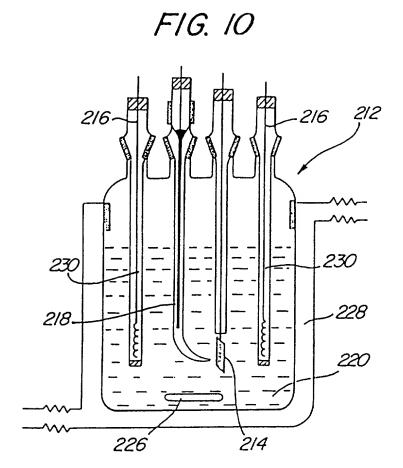
210

-204

206

-208

REMOVE CARBON ELECTRODES FROM BATH AND WASH IN DEIONIZED WATER.



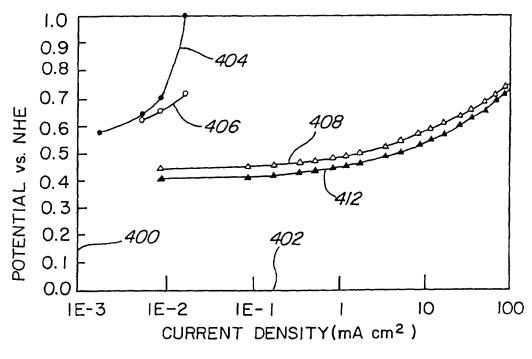


FIG. 12

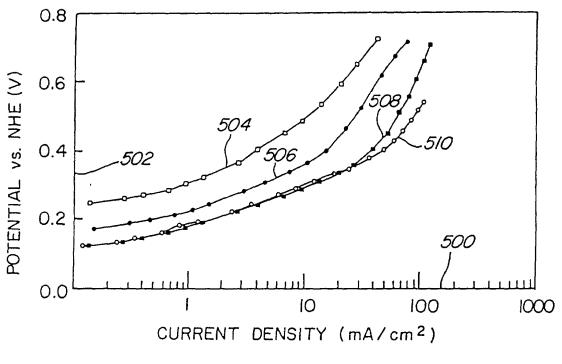
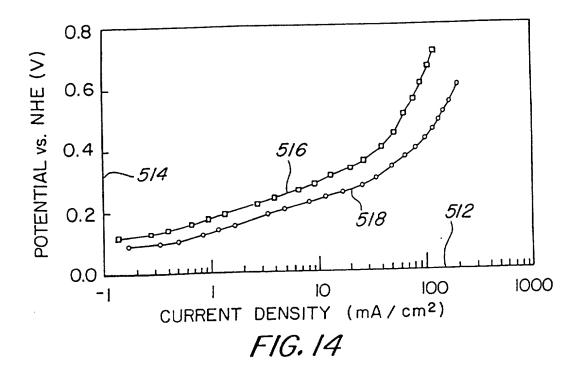
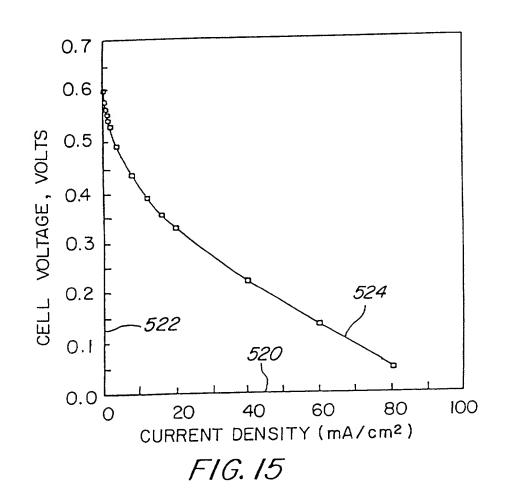
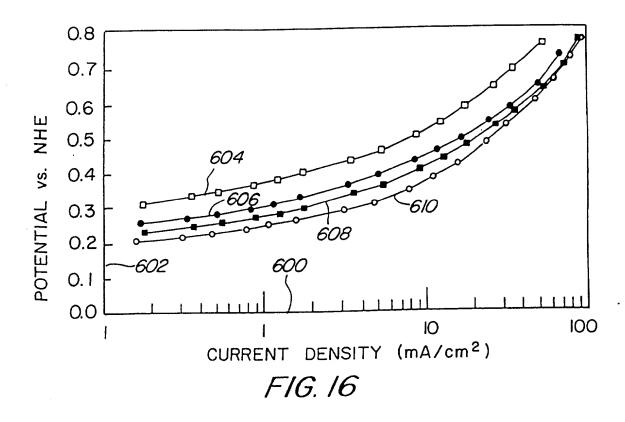
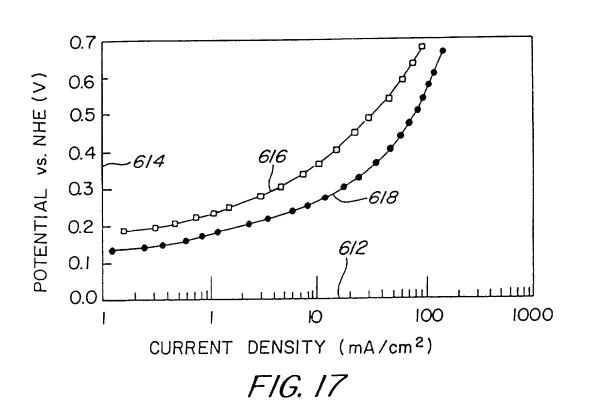


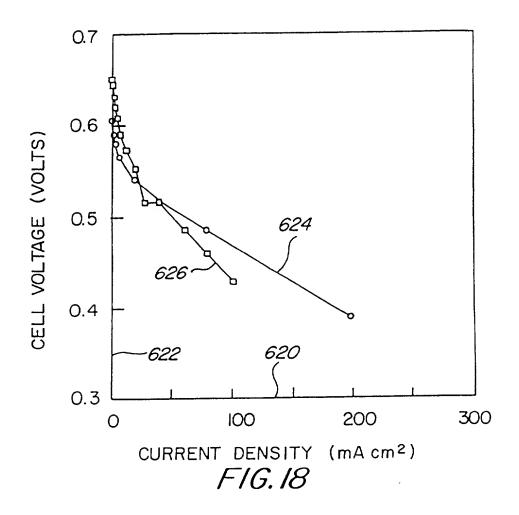
FIG. 13

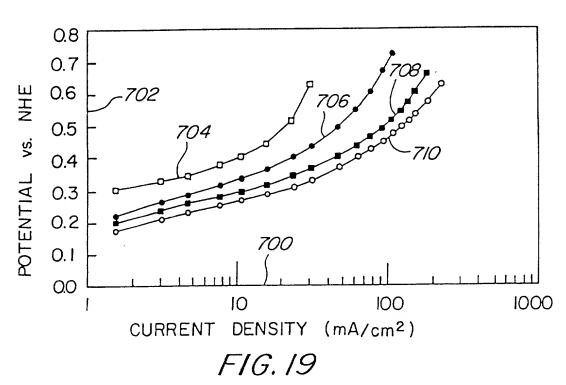












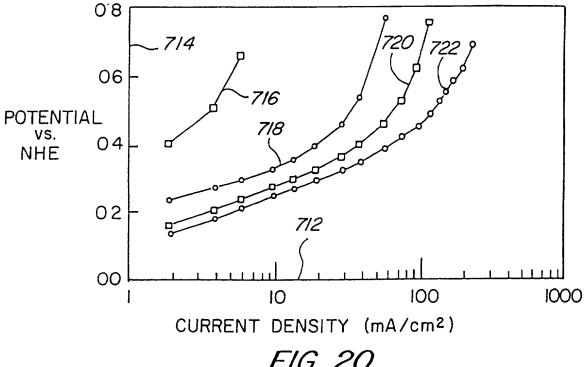


FIG. 20

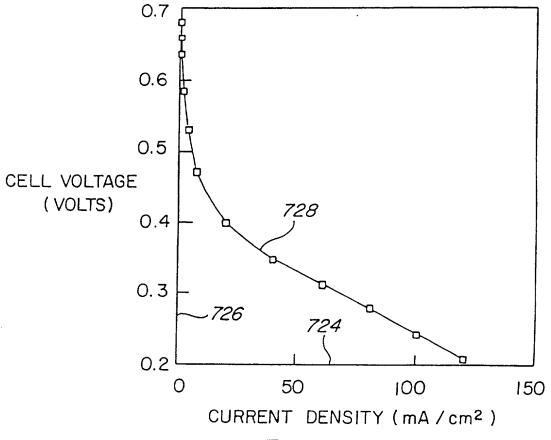


FIG. 21